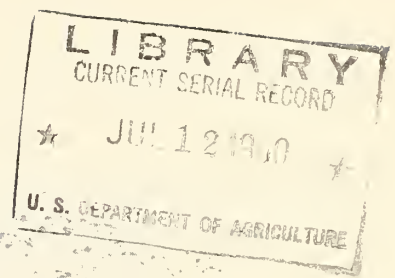


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Maturity and Ripening of



# Max Red BARTLETT PEARS

AMS-389

UNITED STATES DEPARTMENT OF AGRICULTURE  
Agricultural Marketing Service  
Market Quality Research Division

## PREFACE

With the introduction and increasing popularity of the Max Red Bartlett pear, there appeared a need for information on the handling, storage properties, and the quality of the new strain compared with the standard Bartlett.

This project is part of a continuing program of research, designed to evaluate and maintain the quality of farm products through marketing channels.

## SUMMARY AND CONCLUSIONS

There was no significant difference in maturity of Max Red Bartlett pears and standard Bartlett pears from trees of equal age and vigor in the same orchard location.

The flesh texture and flavor of the fruit of the two strains were indistinguishable. However, the skin of the Max Red was thicker and tougher than that of standard Bartlett. This difference in skin texture was apparent when the unpeeled fruits were eaten.

The appearance of the fruit of the red strain was enhanced with ripening. The red color was accentuated by the change in ground color from green to yellow. High temperatures during the late 1955 harvest period caused severe bleaching and buckskin coloration of the late-picked Max Red fruit. This fruit did not become attractive during storage and ripening. Bruises and abrasions were generally less conspicuous on the skin of the Max Red pears than on standard Bartletts.

The time required for ripening at 65° F., and the shelf life were the same for both strains. Scald and core breakdown that occurred during the ripening and holding period were less in the Max Red pears than in the standard Bartletts, but the differences were not sufficiently great to give a significant advantage to the red fruits.

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# **MATURITY AND RIPENING OF MAX RED BARTLETT PEARS**

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## **INTRODUCTION**

Color is important in determining fruit popularity and selection by consumers. Red apples are generally preferred to yellow or green apples of the same quality. Apples classed as Extra Fancy, largely because most of the surface is red, command a considerably higher price than their Fancy counterparts with large patches of green or yellow although the dessert quality of the two grades may be indistinguishable.

Fruit breeders and growers are continually watching for new sports with superior color, shape, and other qualities. Several years ago a red bud sport of Bartlett pear was found by a grower in the lower Yakima Valley, and was named Max Red. Although yellow color has always been associated with Bartletts, the new red strain proved popular in some retail markets. This study was undertaken to evaluate the characteristics of the new strain of pears as to handling, storage, and quality.

## **TREES AND FRUIT**

Two orchards in the Wenatchee, Wash., district were selected for the experimental fruit of the Max Red Bartlett and standard Bartlett strains of pears in the fall of 1955. The trees in orchard A were approximately 25 years old. The trees were all originally standard Bartletts but some had been topworked to the Max Red strain 5 years previously. The trees were not heavily fertilized. Orchard B was a young orchard, the trees being approximately 6 years old. It was heavily fertilized with nitrogen. Adjacent trees of the two strains, of comparable age, size, and vigor, were chosen for the experimental fruit.

## **Harvesting and Handling**

Three pickings were made at each orchard at approximately weekly intervals beginning on August 19 in the older orchard (A), and beginning August 25 in the young orchard (B). (Commercial harvest was begun in these orchards a few days later.) Four bushels of pears of each strain were harvested at each picking. Color, firmness, and soluble solids were determined at time of harvest. Three bushels of each strain at each picking date were packed in plain paper wraps, and placed at 31° F. on the day of harvest.

## **Storage and Ripening**

One bushel of pears from each orchard, strain, and harvest date was removed from 31° F. storage and ripened at each of three intervals from October 1 to February 1. The fruit was evaluated for color, general appearance, ripening capacity, dessert quality, shelf life, and occurrence of scald and breakdown.

## RESULTS

### Maturity at Harvest

No significant differences were found in maturity of the Max Red and the standard Bartletts picked on the same date in the same orchard (table 1). However, fruit of orchard A was more mature than that of the heavily fertilized young trees of orchard B as judged by flesh firmness and soluble solids. For example, on the first picking date, fruit of orchard B was 3.2 pounds firmer and had 1.5 percent less soluble solids than that of orchard A.<sup>1</sup> The fruit of the first picking from the older orchard (A) was as mature as that of the third picking from the young orchard made 24 days later.

The final picking in the young orchard was relatively late for Bartlett pears (September 12), and followed a week of very high day and night temperatures. The bright red color of the Max Reds bleached and became buckskin color, similar to that in red apples subjected to these conditions near harvest time. These pears never became attractive in color, even after ripening. Color stability is an important factor, and the behavior of the red pigment of Max Red Bartletts under unfavorable weather conditions needs further investigation. Factors other than weather, such as maturity, may affect the stability of the red pigment.

TABLE 1.--Firmness, percentage soluble solids, and appearance of Max Red and standard Bartlett pears at harvest

Date harvested and strain	Firmness	Soluble solids	Appearance
Orchard A:			
Aug. 19	<i>Pounds</i>	<i>Percent</i>	
Standard.....	17.5	11.2	Deep green, lack of finish.
Max Red.....	18.2	11.2	Light red, some green areas.
Aug. 26			
Standard.....	16.5	11.4	Medium green, good finish.
Max Red.....	16.8	11.6	Bright red, good finish.
Sept. 2			
Standard.....	15.6	12.4	Light green, good finish.
Max Red.....	15.1	12.0	Deep red, good finish.
Orchard B:			
Aug. 25			
Standard.....	21.7	10.4	Deep green, lack of finish.
Max Red.....	20.4	9.0	Pale red, green areas, poor finish.
Sept. 1			
Standard.....	18.7	10.6	Medium green, good finish.
Max Red.....	18.5	10.2	Bright red, good finish.
Sept. 12			
Standard.....	18.0	10.9	Light green to light yellow ground color, fair finish.
Max Red.....	17.0	10.5	Faded pale red color, fair finish, unattractive. <sup>1</sup>

<sup>1</sup> Probably due to hot weather (95° to 100° F.) during week preceding harvest.

<sup>1</sup> Firmness was measured with a Magness-Taylor pressure tester using a 5/16-inch plunger on the pared surfaces of the fruit.



## Ripening

One box from each harvest lot was removed from 31° F. storage to a 65° ripening room on October 1, November 4, and February 1. Observations were made on ripening rates, texture, flavor, and shelf life. The October 1 and November 4 withdrawals showed similar ripening behavior, and are described together.

All lots of the October withdrawal were of good dessert quality on the fifth day at 65°, and all had an additional shelf life of 3 days (table 2). Fruit from the November withdrawal was of good dessert quality on the fourth day. Most of the pears had an additional shelf life of 2 days (table 3).

Texture and flavor of the two strains from both orchards and for the same picking dates were similar. The quality of the fruit from the older orchard was consistently superior to that of the young orchard.

The appearance of the Max Red pears improved with ripening, owing to the change in ground color from green to yellow, which accentuated the bright red color. The one marked distinction between the two strains was the difference in skin texture. The Max Red pears had thicker and tougher skins than the standard Bartletts. This characteristic was detected by all members of a taste panel, who, when blindfolded, could not distinguish between the peeled flesh of the strains, but could always distinguish between them when nonpeeled samples were tasted. This thicker, tougher skin of the red strain showed less browning due to scuffing and abrasions than that of the standard strain. The intense red color apparently masked much of the browning.

Less core breakdown developed in the Max Red fruit than in the standard Bartletts during the ripening period, with the exception of the September 2 picking. The disorder was confined to the core, and did not affect ripening or eating quality. The differences that existed were not sufficient to alter the shelf life of the two strains. No scald occurred on any of the fruit of the October and November samplings.

February 1 was admittedly too late to expect Bartlett pears from storage to ripen to acceptable dessert quality but the late date was chosen to determine whether there were any marked differences in storage life of the two strains. No marked differences were found. Both strains had been held in cold storage beyond their maximum storage potential (table 4) and had lost their normal ripening capacity.

Pear scald was more severe on the fruit from orchard A than from orchard B, and a greater percentage of the standard Bartletts scalded than of the Max Reds. As was noted previously, there was more core breakdown in the standard strain than in the Max Reds, although it was prevalent in both strains. All the data indicate there is no marked difference in the storage life of standard and Max Red strains of Bartlett pears.

TABLE 2.--Ripening at 65° F. of Max Red and standard Bartlett pears taken from storage at 31° on October 1, 1955

Date harvested and strain	Dessert quality	Time required to reach good dessert quality <sup>1</sup>	Shelf life <sup>2</sup>	Core breakdown <sup>3</sup>	Comments
Orchard A: Aug. 19					
Standard.....	Good	Days 5	Days 3	Percent 22	Both strains had acceptable texture and flavor. No difference in taste between strains.
Max Red.....	Good	5	3	8	
Aug. 26					
Standard.....	Excellent	5	3	47	Standard strain had slightly sweeter taste and stronger varietal flavor than Max Red.
Max Red.....	Excellent	5	3	23	
Sept. 2					
Standard.....	Excellent	5	3	19	Same comments as for Aug. 26 picking.
Max Red.....	Excellent	5	3	21	
Orchard B: Aug. 25					
Standard.....	Poor - little flavor	5	3	78	Distinct lack of varietal flavor in both strains.
Max Red.....	Poor - little flavor	5	3	29	
Sept. 1					
Standard.....	Good	5	3	77	Texture and flavor of strains were similar.
Max Red.....	Good	5	3	33	
Sept. 12					
Standard.....	Good	5	3	41	Appearance of Max Red poor, some fruits with pithy texture failed to ripen normally.
Max Red.....	Fair	5	3	5	

<sup>1</sup> After being removed from storage.

<sup>2</sup> After reaching good dessert quality.

<sup>3</sup> After 9 days of ripening.



TABLE 3.--Ripening at 65° F. of Max Red and standard Bartlett pears  
taken from storage at 31° on November 4, 1955

Date harvested and strain	Dessert quality	Time required to reach good des- sert quality <sup>1</sup>	Shelf life <sup>2</sup>	Core breakdown <sup>3</sup>	Comments
Orchard A:					
Aug. 19		<i>Days</i>	<i>Days</i>	<i>Percent</i>	
Standard...	Good	4	2	84	Texture and flavor of both strains similar. Max Red appearance im- proved by ripening.
Max Red....	Good	4	2	32	
Aug. 26					
Standard...	Excellent	4	2	84	Texture and flavor of both strains similar. Max Red appearance im- proved by ripening.
Max Red....	Excellent	4	2	40	
Sept. 2					
Standard...	Excellent	4	2	60	Texture and flavor of both strains similar. Max Red developed least scuff marks.
Max Red....	Excellent	4	2	12	
Orchard B:					
Aug. 25					
Standard...	Poor	4	2	52	Both strains lacked full varietal flavor. Picked too early.
Max Red....	Poor	4	2	32	
Sept. 1					
Standard...	Fair to good	4	2	60	Texture and flavor of both strains similar. Less scuffing injury in Max Red than in stand- ard.
Max Red....	Fair to good	4	2	36	
Sept. 12					
Standard...	Good	4	3	18	Preferable texture and flavor in standard. Some Max Red fruits failed to ripen nor- mally.
Max Red....	Fair	4	3	8	

<sup>1</sup> After being removed from storage.

<sup>2</sup> After reaching good dessert quality.

<sup>3</sup> After 7 days of ripening.

TABLE 4.--Observation on ripening at 65° F. of Max Red and standard Bartlett pears taken from storage at 31° on February 1, 1956

Date harvested and strain	Dessert quality	Period ripened <sup>1</sup>	Shelf life	Pear scald <sup>2</sup>	Core breakdown <sup>2</sup>	Comments
Orchard A:						
Aug. 19		<i>Days</i>	<i>Days</i>	<i>Percent</i>	<i>Percent</i>	
Standard.....	Poor	5	None	78	96	Both strains developed pear scald at 31° F. Max Red developed less scald and core breakdown than standard.
Max Red.....	Poor	5	None	42	64	
Aug. 26						
Standard.....	Poor	5	None	60	83	Some scald in both strains at 31° but less in Max Red than in standard. Scald increased greatly during ripening. Less core breakdown in Max Red.
Max Red.....	Poor	5	None	72	28	
Sept. 2						
Standard.....	Poor	5	None	33	84	No scald occurred at 31°. Less core breakdown and scald in Max Red than in standard.
Max Red.....	Poor	5	None	0	42	
Orchard B:						
Aug. 25						
Standard.....	Poor	5	None	2	70	Max Red developed less scald and core breakdown than standard.
Max Red.....	Poor	5	None	0	28	
Sept. 1						
Standard.....	Poor	5	None	11	70	Max Red was highly colored and developed less scald and core breakdown than standard.
Max Red.....	Poor	5	None	0	50	
Sept. 12						
Standard.....	Poor	5	None	0	30	Max Red fruit was faded in color. Many fruits small in size because of "clean-up" picking.
Max Red.....	Poor	5	None	0	18	

<sup>1</sup> After being removed from storage, none of the sound fruits softened to acceptable eating condition. Both standard and Max Red had lost their normal ripening capacity because of having been stored too long.

<sup>2</sup> After 5 days of ripening.



